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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
08/479,810	06/07/95	BEDNORZ	J Y0987-074BY

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EXAMINER

IBM CORPORATION  
INTELLECTUAL PROPERTY LAW  
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~ MC GINTY, D

ART UNIT PAPER NUMBER

1105

DATE MAILED: 05/27/97

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

## Office Action Summary

Application No. 08/479,810	Applicant(s) Bednorz et al.
Examiner Douglas J. McGinty	Group Art Unit 1105



Responsive to communication(s) filed on Apr 14, 1997

This action is FINAL.

Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

### Disposition of Claims

Claim(s) 1-108 is/are pending in the application.

Of the above, claim(s) 2-11,32,39,47-54,60-63,65-68,73-76,82,83,87-90 is/are withdrawn from consideration.

Claim(s) \_\_\_\_\_ is/are allowed.

Claim(s) 1,12-31,33-38,40-46,55-59,64,69-72,77-81,84-86,91-96, & 103 is/are rejected.

Claim(s) \_\_\_\_\_ is/are objected to.

Claims \_\_\_\_\_ are subject to restriction or election requirement.

### Application Papers

See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.

The proposed drawing correction, filed on \_\_\_\_\_ is  approved  disapproved.

The specification is objected to by the Examiner.

The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. § 119

Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

All  Some\*  None of the CERTIFIED copies of the priority documents have been

received.

received in Application No. (Series Code/Serial Number) \_\_\_\_\_.

received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\*Certified copies not received: \_\_\_\_\_

Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

### Attachment(s)

Notice of References Cited, PTO-892

Information Disclosure Statement(s), PTO-1449, Paper No(s). \_\_\_\_\_

Interview Summary, PTO-413

Notice of Draftsperson's Patent Drawing Review, PTO-948

Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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## **DETAILED ACTION**

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action in an ancestral application.

### ***Election/Restriction***

2. Applicant's election of Group I, claims 1, 12-31, 33-38, 40-46, 55-59, 64, 69-72, 77-81, 84-86, 91-96, and 103 in Paper No. 13 (May 12, 1997) is acknowledged.

a. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse.<sup>1</sup>

b. Accordingly, claims 2-11, 32, 39, 47-54, 60-63, 65-68, 73-76, 82, 83, 87-90, 97-102, and 104-108 are withdrawn from further consideration. This restriction requirement is made FINAL.

### ***Information Disclosure Statement***

3. There is no Information Disclosure Statement in the file. It is requested that an IDS be filed, with citations to all of the references cited in the ancestral applications. The references themselves need not be supplied, however.

4. It is requested that this Examiner be notified of all pending, related applications.<sup>2</sup> That notice need not be in a PTO form - 1449, however.<sup>3</sup>

### ***Claim Rejections - 35 USC § 112***

5. The specification is objected to under 35 U.S.C. § 112, *first paragraph*, as failing to provide an enabling disclosure commensurate with the scope of the claims.

a. The present specification is deemed to be enabled only for apparatuses with compositions comprising at least one each of rare earth (or IIIB), an alkaline earth, and copper

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<sup>1</sup>See MPEP § 818.03(a).

<sup>2</sup>See MPEP 2001.06(b).

<sup>3</sup>See MPEP 901.03.

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oxide. The art of high temperature (above 30°K) superconductors is an extremely unpredictable one. Small changes in composition can result in dramatic changes in or loss of superconducting properties. The amount and type of examples necessary to support broad claims increases as the predictability of the art decreases.<sup>4</sup> Claims broad enough to cover a large number of compositions that do not exhibit the desired properties fail to satisfy the requirements of 35 USC 112.<sup>5</sup> Merely reciting a desired result does not overcome this failure.<sup>6</sup> In particular, the question arises: Will any layered perovskite material containing copper exhibit superconductivity?

b. It should be noted that at the time the invention was made, the theoretical mechanism of superconductivity in these materials was not well understood. That mechanism still is not understood. Accordingly, there appears to be little factual or theoretical basis for extending the scope of the claims much beyond the proportions and materials actually demonstrated to exhibit high temperature superconductivity. A "patent is not a hunting license. It is not a reward for the search, but a reward for its successful conclusion".<sup>7</sup>

c. Claims 1, 12-31, 33-38, 40-46, 55-59, 64, 69-72, 84, 85, and 91-96 are rejected under 35 U.S.C. § 112, *first paragraph*, for the reasons set forth in the objection to the specification.

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<sup>4</sup>See In re Fisher, 166 USPQ 18, 24; and In re Angstadt and Griffen, 190 USPQ 214, 218.

See also, In re Colianni, 195 USPQ 150, 153, 154 (CCPA 1977) (J. Rich).

<sup>5</sup>See In re Cook, 169 USPQ 298, 302; and Cosden Oil v. American Hoechst, 214 USPQ 244, 262.

<sup>6</sup>See In re Corkill, 226 USPQ 105, 1009.

<sup>7</sup>See Brenner v. Manson, 383 US 519, 148 USPQ 689.

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6. **Claims 1, 12-31, 33-38, 40-46, 55-59, 64, 69-72, 77-81, 84-86, 91-96, and 103 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

a. Claim 1, lines 2 and 3, is unclear with the term "rare earth-like element". The terms "type" and "like" are unclear.<sup>8</sup> It is suggested that the same term be changed to -- or Group IIIB element --.

b. Claim 1, line 5, is unclear with the term ".us on;". It is suggested that the same term be deleted.

c. Claim 1, line 7, is unclear with the term "supercurrent". It is suggested that the same term be changed to -- current --.

d. Claim 12, lines 3-6, provide the means for passing an electrical current and cooling the composition "while said composition is at a temperature > 26°K". However, superconductivity does not occur when the temperature is > 26°K, but rather, that superconductivity occurs when the temperature is -- at or below said transition temperature --.

e. Claim 17 is unclear with the term "rare earth-like element".

f. Claim 19 is unclear with the term "perovskite-like superconducting phase".

g. Claims 20-23 are unclear with the term "substituted transition metal oxide". That terminology is unclear as to what is the substitute for Cu-oxide and as to how much substitution occurs.

h. Claim 24, line 6, is unclear with the term "supercurrent". It is suggested that the same term be changed to -- current --.

i. Claim 27, line 2, has the terminology "substituted Cu-oxide" but that terminology is unclear as to what is the substitute for Cu-oxide and as to how much substitution occurs.

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<sup>8</sup>See MPEP 2173.05(b), part (e).

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j. Claim 27, lines 2-4, has the language "said composition being a substituted Cu-oxide including a superconducting phase having a structure substantially close to the orthorhombic-tetragonal phase transition of said composition". That language is found to be indefinite because it is unclear how close is "substantially close". Relative terminology in a claim is indefinite when one of ordinary skill in the art would not be apprised of the scope of the claim.<sup>9</sup> In this case, one skilled in the art would not be able to determine whether the superconducting phase is physically close to the orthorhombic-tetragonal phase transition or whether that phase is "like" that transition.

k. Claim 28 is unclear with the language "rare earth-like".

l. Claim 29 is unclear with the language "substituted Cu-oxide".

m. Claim 30 is indefinite with the limitation that "said alkaline earth element is atomically large with respect to Cu". That limitation is unclear as to how the alkaline earth element is "large", i.e., whether size is measured according to covalent radius, metallic radius, or atomic volume. The term "large" also is unclear as to how large is "large".<sup>10</sup>

n. Claim 33, lines 3 and 4, is unclear as to whether the alkaline earth element is concentrated "near" to the copper oxide concentration or whether the degree of alkaline earth element concentration is "near" to the amount of copper oxide concentration. If the latter is the case, then it is unclear if the degree of concentration is in molar or weight percentages.

o. Claim 33, lines 4-6, is unclear as to the "superconducting copper oxide phase" changes into the tetragonal structural phase or whether that "superconducting copper oxide phase" is found in a composition at the boundary between orthorhombic and tetragonal phases.

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<sup>9</sup>See 2173.05(b).

<sup>10</sup>See MPEP 2173.05(b), subpart (f).

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p. Claim 34 is incomplete because it involves "(a) superconducting apparatus" but comprises only a composition. Means are not provided for cooling the composition and for passing an electrical current through it.

q. Claim 34, lines 3 and 4, is indefinite with the language "a mixed copper oxide doped with an element chosen to **create Cu<sup>3+</sup> ions**" (emphasis added). That language is unclear because it is not possible to "create" copper through the choice of dopants.

r. Claim 36, line 4, is unclear with the language "substituted copper oxide".

s. Claim 36, lines 7-12, provides the means for passing an electrical current and cooling the composition "while said composition is at a temperature in excess of 26°K". However, superconductivity does not occur when the temperature is > 26°K, but rather, that superconductivity occurs when the temperature is -- at or below said superconducting onset temperature --.

t. Claim 38, lines 2 and 3, is indefinite with the language "at least one other element is an element which **creates Cu<sup>3+</sup> ions**" (emphasis added). That language is unclear because no other element "creates" copper.

u. Claim 40, lines 2-4, is unclear with the language "said superconductor being comprised of at least four elements, none of which is itself superconducting". Included with this Office Action are pp. E-84 and E-85 of the Handbook of Chemistry and Physics (82-83), which show that rare earth and IIIB metals (La, Ce, Lu) will superconduct, as well as a IIA metal (Ba).

v. Claim 42 is incomplete because it involves "(a) superconducting apparatus" but comprises only a composition. Means are not provided for cooling the composition and for passing an electrical current through it.

w. Claim 42, line 3, is unclear because the term "doped transition metal oxide" does not indicate what the dopant is.

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x. Claim 43 is indefinite with the requirement that the "doped transition metal oxide is multivalent". A metallic element may be "multivalent" but it is unclear how an oxide may be "multivalent" as well.

y. Claim 46 is incomplete because it involves "(a)n apparatus" but comprises only a composition. Means are not provided for cooling the composition or for passing an electrical current through it is incomplete because it involves "(a) superconducting apparatus" but comprises only a composition. Means are not provided for cooling the composition or for passing an electrical current through it.

z. Claim 55, lines 3-5, are indefinite with the language "said transition metal being non-superconducting and said oxide having multivalent states". Presumably the transition metal is superconducting when in the appropriate oxide form. Also, the oxide itself does not have "multivalent states", while the metallic elements may.

aa. Claim 55 also does not provide for a -- superconducting onset temperature in excess of 26°K --, nor does it provide for a means of cooling the composition and passing an electrical current -- at a temperature at or below said superconducting onset temperature --.

bb. Claim 57, lines 3 and 4, is unclear with the language "containing at least 3 non-superconducting elements". Those elements are not "non-superconducting elements" when they form part of the "superconducting oxide".

cc. Claim 57, line 5, is unclear with the term "supercurrent".

dd. Claim 57 does not provide for a means of cooling the composition and passing an electrical current -- at a temperature at or below said superconducting onset temperature --.

ee. Claim 58, lines 2 and 3, is unclear with the language "an element which creates a mixed valent state in said oxide". The element itself does not "create" that state, and that mixed valent state is found in the metals instead of the oxide itself.

ff. Claim 58, line 4, is unclear with the term "layer-like structure".

gg. Claim 58, line 5, is unclear with the term "supercurrent".

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hh. Claim 58, lines 5-9, does not provide for a -- superconducting onset temperature in excess of 26°K --, nor does it provide for a means of cooling the composition and passing an electrical current -- at a temperature at or below said superconducting onset temperature --.

ii. Claim 59, lines 2, 6, 7, and 9, is unclear with the term "ceramic-like".

jj. Claim 59, lines 5-11, does not provide for a means of cooling the composition and passing an electrical current -- at a temperature at or below said superconducting onset temperature --.

kk. Claim 64 is indefinite.

i. The term "mixed copper oxide" is unclear as to whether metals other than copper must be present.

ii. The term "element" is unclear as to whether it involves an element other than copper and oxide.

iii. The language "distorted octahedral oxygen environment" is unclear as to what the "environment" is or how it is related to the composition.

iv. That claim does not provide for a -- superconducting onset temperature in excess of 26°K --, nor does it provide for a means of cooling the composition and passing an electrical current -- at a temperature at or below said superconducting onset temperature --.

v. The term "supercurrent" is unclear.

ll. Claim 69 does not provide for/a -- superconducting onset temperature in excess of 26°K --, nor does it provide for a means of cooling the composition and passing an electrical current -- at a temperature at or below said superconducting transition temperature --.

mm. Claim 72 is unclear with the term "rare earth-like element".

nn. Claim 77 is unclear with the terms "rare earth-like element" and "layer-like crystalline structure".

oo. Claim 77 also is unclear with the recitation "said composition having ... multi-valent oxidation states". The metallic elements have those states, not the composition *per se*.

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pp. Claim 77 further does not provide for a -- superconducting onset temperature in excess of 26°K --, nor does it provide for a means of cooling the composition and passing an electrical current -- at a temperature at or below said superconducting transition temperature --.

qq. Claim 80 is unclear with the term "perovskite-like".

rr. Claim 84 does not provide for a -- superconducting onset temperature in excess of 26°K --, nor does it provide for a means of cooling the composition and passing an electrical current -- at a temperature at or below said superconducting transition temperature --.

ss. Claim 86, line 2, is unclear with the term "rare earth-like" element.

tt. Claim 86, line 3, should have -- metal -- instead of "metla".

uu. Claim 86 does it provide for a means of cooling the composition and passing an electrical current -- at a temperature at or below the temperature for said superconducting state --.

vv. Claim 91 is unclear with the language "exhibiting the onset of a DC substantially zero resistance state" because the term "DC" has not been defined.

ww. Claim 91 does not provide for a -- superconducting onset temperature in excess of 26°K --, nor does it provide for a means of cooling the composition and passing an electrical current -- at a temperature at or below said superconducting transition temperature --.

xx. Claim 93 is indefinite.

i. That claim is unclear with the term "mixed copper oxide" because it does not indicate with what the copper oxide is "mixed".

ii. That claim does not provide for a means of cooling the composition and passing an electrical current -- at a temperature at or below said onset temperature --.

yy. Claim 94 is unclear with the term "layer-like".

zz. Claim 95 is unclear with the requirement that "said copper oxide material exhibits a mixed valence state". The copper element, not the oxide material, exhibits that "mixed valence state".

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aaa. Claim 96, lines 3-5, has the language "the superconductive composition consisting essentially of a copper-oxide compound having a layer-type perovskite-like crystal structure".

- i. The terms "type" and "like" are unclear.
- ii. That language also is unclear as to whether other elements must be present as well.

bbb. Claim 103, lines 5 and 6, is unclear with the terms "layer-type", "perovskite-type", and "rare-earth-like".

*Claim Rejections - 35 USC § 103*

7. **Claims 1, 12-31, 33-38, 40-46, 55-59, 64, 69-72, 77-81, 84-86, 91-96, and 103 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Asahi Shinbum, International Satellite Edition (London), November 11, 1986 (hereinafter, "the Asahi Shinbum article").**

a. The scope and contents of the prior art are determined as follows:

i. As discussed in paper no. 20 of the ancestral application, 07/053,307, it is not fully clear to what exact date applicants are entitled. Based on the record, nonetheless, that date would appear to be no later than around December 13, 1986, the date samples were tested in the US to show superconductivity.<sup>11</sup> The Asahi Shinbum article was published on November 28, 1986.

ii. The reference confirms superconductivity in an oxide compound of La and Cu with Ba having a structure of the so-called perovskite structure.

b. The differences between the prior art and the claims at issue are ascertained as follows:

i. Although the reference may not teach use of the testing of zero resistance for confirming superconductivity, it *prima facie* must have been used because it is one of two methods used for testing for superconductivity (the other being diamagnetism). Accordingly, the

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<sup>11</sup>See MPEP 715 et seq.

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burden of proof is upon the applicants to show that the instantly claimed subject matter is different from and unobvious over that taught by this reference.<sup>12</sup>

ii. The reference may not specifically teach a means of cooling the composition to a temperature at or below the onset of superconductivity and the means for passing an electrical current through that composition under superconducting conditions. Nevertheless, the reference did teach testing at temperatures of up to 30°K. Since temperatures on the Earth's surface are much greater than 30°K, it would have been obvious to use a cooling means to attain that colder temperature. Moreover, the reference discusses superconductivity, which connotes the passing of electricity through an object under superconducting conditions. Passing electricity under those conditions also would have been obvious because the reference discusses certain applications, such as very strong magnets, NMR machines, linear motorcars, electricity transport systems, etc.

iii. The reference also may not specifically teach orthorhombic-tetragonal phase transitions, doping, mixed valence states, non-stoichiometric oxygen, layered perovskite crystalline structures, electron-phonon interactions, substituted copper oxide, Cu<sup>3+</sup> ions, ceramic materials, enhanced polaron formation, distorted octahedral oxygen environment, or distorted orthorhombic crystalline structure. Nevertheless, the reference is deemed to teach the claimed composition; the applicant or applicants need to show that his, her, or their invention is actually different from and unexpectedly better than the prior art.<sup>13</sup>

c. The level of ordinary skill in the relevant art is resolved with the finding that, based on the teachings of the Asahi Shinbum article as a whole, it would have been obvious to one of

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<sup>12</sup>See In re Brown, 173 USPQ 685, 688; In re Best, 195 USPQ 430; and In re Marosi, 218 USPQ 289, 293.

<sup>13</sup>See In re Best, 195 USPQ 430, 433, 434 (CCPA 1977).

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such skill because that reference teaches superconductivity in an oxide compound of La and Cu with Ba having a structure of the so-called perovskite structure.

***Possibly Allowable Subject Matter***

8. It is noted that the applicants were awarded the Nobel Prize for their work in this area. The record is not deemed to indicate, however, that the Asahi Shinbum article was predicated by the applicants' earlier conception and/or reduction to practice *in this country*. The presently claimed invention also is non-enabling and indefinite for the reasons set forth above.

9. To possibly overcome the above rejections, the following amendments are suggested:

a. 109 (New). A superconductive apparatus comprising:

a composition of the formula  $Ba_xLa_{5-x}Cu_5O_y$ , wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature in excess of 26°K;

a means for maintaining the temperature of said composition at a temperature less than said critical temperature to induce said superconducting state in said metal oxide phase; and

a means for passing an electrical current through said composition while said metal oxide phase is in said superconducting state.

b. Cancel claims 1-108.

10. The following is an Examiner's statement of reasons for the indication of possibly allowable subject matter:

a. The Asahi Shinbum article teaches in general that perovskite-like compounds of La, Cu, and Ba have a  $T_c$  of 30°K, but that article apparently does not teach apparatuses with the particular formula in the amendment suggested above. The examples in the present specification are deemed to show criticality for that formula in that suggested amendment.

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b. Support for the proposed amendment is found at p. 20, line 1, through p. 25, line 5, and in Figure 3.

c. This indication of possibly allowable subject matter is subject to further consideration and review.

***Conclusion***

11. Any amendment in response to this Office Action must NOT include any new matter.

12. The other prior art cited in the enclosed PTO form 892 is made of record but not relied upon in this Office Action. Nevertheless, that prior art is considered pertinent to the present disclosure. All of the references cited in this application indicate the level of skill in the relevant art at the time the invention was made.

13. The applicant or applicants is or are reminded that any evidence to be presented in accordance with 37 CFR 1.131 or 1.132 should be submitted before final rejection in order to be considered timely.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas J. McGinty, whose telephone number is (703) 308-3805. The examiner normally can be reached on Monday through Friday from 8:30 A.M. to 5:00 P.M., Eastern time. If *reasonable* attempts to reach the examiner by telephone are unsuccessful, however, the examiner's supervisor, Mr. Paul Lieberman, can be reached at (703) 308-2523. Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0661. The fax number for this Group is (703) 305-3600.

May 21, 1997  
479810.1

*Douglas J. McGinty*  
**Douglas J. McGinty**  
**Primary Examiner**  
**Group 1100**